

What is claimed is:

1. A head for a toothbrush, comprising :
a housing;
a bristle member movably fitted to said housing and including a first set of bristles;
a motion directing assembly structured and disposed for rotating said first set of bristles in an oscillating motion through an arc of rotation about a central rotational axis; and
said motion directing assembly being further structured for simultaneously moving said first set of bristles in a linear reciprocating motion and parallel to said central rotational axis.
2. The head as recited in Claim 1 further comprising :
a second set of bristles movably supported on said housing of said head; and
said motion directing assembly being structured for simultaneously moving both said first set of bristles and said second set of bristles in said oscillating motion and said linear reciprocating motion .
3. The head as recited in Claim 2 wherein said second set of bristles is movably supported on said central rotation axis and said motion directing assembly is structured for moving said first set of bristles in said oscillating motion in one direction through said arc of rotation about said central rotational axis while simultaneously moving said second set of bristles in said oscillating motion in an opposite direction through said arc of rotation about said central rotational axis so that said first set of bristles and said second set of bristles counter-rotate relative to one another while moving in said oscillating motion.
4. The head as recited in Claim 3 wherein said motion directing assembly is further structured for simultaneously moving said first set of bristles and said second set of bristles in said linear reciprocating motion, wherein said first set of bristles and said second set of bristles

are moved in opposite phase relative to one another so that when said first set of bristles is moving in one linear direction, said second set of bristles is moving in an opposite linear direction.

5. The head as recited in Claim 1 further comprising :

a plurality of said first set of bristles, each of said plurality of first set of bristles being movably supported on said housing about an individual central rotational axis.

6. The head as recited in Claim 4 further comprising:

a plurality of said first set of bristles movably supported on said housing;

a plurality of said second set of bristles movably supported on said housing, and each of said plurality of said second set of bristles being operatively positioned with a corresponding one of said plurality of first set of bristles so that each of said correspondingly positioned first and second set of bristles are movable about a common individual rotational axis; and

said motion directing assembly being structured for simultaneously moving said plurality of said first set of bristles and said plurality of said second set of bristles in said oscillating motion and said linear reciprocating motion.

7. A head for a toothbrush, comprising:

a housing;

a first set of bristles movably fitted to said housing on a central rotational axis;

a second set of bristles movably fitted to said housing on said central rotational axis;

a motion directing assembly structured and disposed for rotating said first set of bristles in an oscillating motion through an arc of rotation about said central rotational axis, and said motion directing assembly being further structured and disposed for rotating said second set of bristles in an oscillating motion through an arc of rotation about said central rotational axis; and

said motion directing assembly being further structured for simultaneously moving said first set of bristles and said second set of bristles in a linear reciprocating motion and parallel to said central rotational axis with said first set of bristles moving in one linear direction while said second set of bristles move in an opposite linear direction throughout said linear reciprocating motion of said first said and said second set of bristles.

8. The head as recited in Claim 7 wherein said motion directing assembly is structured for moving said first set of bristles in said oscillating motion in one rotational direction about said arc of rotation while simultaneously moving said second set of bristles in said oscillating motion in an opposite rotational direction about said arc of rotation so that said first set of bristles and said second set of bristles counter-rotate relative to one another while moving in said oscillating motion.

9. The head as recited in Claim 8 further comprising:

a plurality of said first set of bristles, each of said plurality of said first set of bristles being movably supported on said housing about an individual central rotational axis;

a plurality of said second set of bristles, each of said plurality of said second set of bristles being operatively positioned with a corresponding one of said plurality of said first set of bristles and movably supported on said housing about said individual central rotational axis of said corresponding one of said plurality of said first set of bristles, and each of said plurality of said first set of bristles and said plurality of said second set of bristles being movable in said oscillating motion about said individual central rotational axis, and each of said plurality of said first set of bristles and said second set of bristles being movable in said linear reciprocating motion parallel to said individual central rotational axis; and

said motion directing assembly being structured for simultaneously moving said plurality of said first set of bristles and said plurality of said second set of bristles in said oscillating motion and said linear reciprocating motion.

10. A head for a toothbrush, comprising:

a housing;

a bristle member movably fitted to said housing about a central rotational axis, and said bristle member, including a first portion with an upper disk movably captivated within said interior of said housing and a second portion disposed on an exterior of said housing, said second portion, including a bristle support structure with a first set of bristles extending outwardly therefrom and arranged in a pattern about said central rotational axis;

said bristle member further including a first cylinder member;

a second cylinder member positioned and disposed in axial alignment with said first cylinder member within said interior of said housing;

means for rotating said upper disk about said central rotational axis in an oscillating motion through an arc of rotation about said central rotational axis; and

cooperating thread means on said first and second cylinder members for directing movement of said bristle support structure and said first set of bristles in an oscillating motion through an arc of rotation about said central rotational axis upon rotation of said upper disk in said oscillating motion, and said cooperating thread means being further structured for simultaneously directing said bristle support structure and said attached first set of bristles in a linear reciprocating motion away from and back towards said housing and generally parallel to said central rotational axis.

11. A head for a toothbrush, comprising:

a housing;

a bristle member movably fitted to said housing about a central rotational axis, and said bristle member including a first portion with a top disk movably captivated within an interior of said housing and a second portion disposed on an exterior of said housing, said second portion including a bristle support structure with a first set of bristles extending outwardly therefrom and arranged in a pattern about said central rotational axis;

first thread means formed about an outer annular side surface of said top disk;

second thread means formed about said interior of said housing;

means for rotating said top disk about said central rotational axis in an oscillating motion through an arc of rotation about said central rotational axis; and

said first and second thread means cooperating with one another, in threaded engagement, for directing movement of said bristle support structure and said attached first set of bristles in an oscillating motion through an arc of rotation about said central rotational axis while simultaneously directing said bristle support structure and said first set of bristles in a linear reciprocating motion away from and back towards said housing and generally parallel to said central rotational axis upon rotation of said top disk in said oscillating motion.

12. A head for a toothbrush, comprising:

a housing;

a bristle member movably fitted to said housing about a central rotational axis, and said bristle member including a first portion with a top disk movably captivated within an interior of said housing and a second portion disposed on an exterior of said housing, said second portion

including a bristle support structure with a first set of bristles extending outwardly therefrom and arranged in a pattern about said central rotational axis;

a plurality of ramp members each having an inclined surface and protruding from a top surface of said bristle support structure and said inclined surface of each of said plurality of ramp members cooperating with corresponding and congruently configured grooves formed in an outer surface of said housing;

a biasing element for urging said bristle support structure towards said outer surface of said housing so that said inclined surface of each of said ramp members is forced into engagement with said corresponding grooves;

means for rotating said top disk of said bristle member about said central rotational axis in an oscillating motion through an arc of rotation about said central rotational axis; and

said ramp members and said corresponding grooves being structured and configured for directing said bristle support structure and said attached first set of bristles in said oscillating motion through said arc of rotation about said central rotational axis while simultaneously directing said bristle support structure and said attached first set of bristles in a linear reciprocating motion away from and back towards said outer surface of said housing and generally parallel to said central rotational axis.

13. A head for a toothbrush comprising:

a housing;

a bristle member movably fitted to said housing about a central rotational axis, and said bristle member including a first portion movably captivated within an interior of said housing and a second portion disposed on an exterior of said housing, said second portion including a

bristle support structure with a first set of bristles extending outwardly therefrom and arranged in a pattern about said central rotational axis;

said first portion of said bristle member further including a hollow cylinder extending upwardly from said bristle support structure and having a first gear member formed thereabout with a plurality of first gear teeth;

a fixed cylinder attached to said head on said exterior of said housing and being structured and disposed for cooperating receipt within said hollow cylinder on said bristle member;

a rack gear, including a plurality of rack teeth structured and disposed for cooperating, driven engagement with said plurality of first gear teeth of said first gear member for rotating said bristle member about said rotational axis in an oscillating motion as said rack gear is moved in a linear reciprocating motion, thereby causing oscillating motion of said first set of bristles through an arc of rotation about said central rotational axis; and

cooperating thread means formed on an exterior surface of said fixed cylinder and an interior cylindrical surface of said hollow cylinder, respectively, said cooperating thread means being structured and disposed for directing said bristle support structure and said attached first set of bristles in a linear reciprocating motion away from and back towards said housing and generally parallel to said central rotational axis as said first set of bristles is simultaneously moved in said oscillating motion.

14. A head for a toothbrush comprising:

a housing;

a bristle member movably fitted to said housing about a central rotational axis, and said bristle member including a first portion movably captivated within an interior of said housing

and a second portion disposed on an exterior of said housing, said second portion including a bristle support structure with a first set of bristles extending outwardly therefrom and arranged in a pattern about said central rotational axis;

said first portion of said bristle member including a hollow cylinder extending upwardly from said bristle support structure and including an inner cylindrical surface and a first gear member formed thereabout with a plurality of first gear teeth;

a floating cylinder member rotatably fitted within said interior of said head and said floating cylinder member including an exterior cylindrical surface with a second gear member formed thereabout including a plurality of second gear teeth, and said floating cylinder member being structured and disposed for receipt within said hollow cylinder on said bristle member;

a second set of bristles attached to and extending from said floating cylinder member and outwardly through said bristle support structure along said central rotational axis so that said first set of bristles is positioned in surrounding relation to said second set of bristles;

a rack gear assembly, including a first lower rack gear with a plurality of first rack gear teeth structured and disposed for intermeshing driven engagement with said first gear teeth of said first gear member and a second upper rack gear laterally offset relative to said first lower rack gear, said second upper rack gear member including a plurality of second rack gear teeth structured and disposed for intermeshing, driven engagement with said second gear teeth of said second gear member on said floating cylinder member;

said first lower rack gear drivingly engaging said first gear member on said bristle member for rotating said first set of bristles in an oscillating motion about said central rotational axis, and said second upper rack gear drivingly engaging said second gear member on said floating cylinder for simultaneously rotating said second set of bristles in an oscillating motion

about said central rotational axis and in an opposite rotational direction relative to said first set of bristles; and

cooperating thread means formed about said exterior cylindrical surface of said floating cylinder member and said inner cylindrical surface of said hollow cylinder on said bristle member for driving said second set of bristles in a linear reciprocating motion outwardly away from said housing and back towards said housing so that said second set of bristles move outwardly relative to said first set of bristles and inwardly relative to said first set of bristles as said first lower rack gear and said second upper rack gear drivingly engage said first and second gear members; and

means for moving said rack gear assembly, including said first lower rack gear and said second upper rack gear, in a linear reciprocating motion for drivingly engaging said first and second gear teeth of said first and second gear members, respectively.

15. A head for a toothbrush comprising:

a housing;

a bristle member movably fitted to said housing about a central rotational axis, and said bristle member including a first portion movably captivated within an interior of said housing and a second portion disposed on an exterior of said housing, said second portion including a bristle support structure with a first set of bristles extending outwardly therefrom and arranged in a pattern about said central rotational axis;

a first hollow cylinder member fixed to said bristle member and extending upwardly therefrom in axial alignment with said central rotational axis and including an open top and a hollow interior with an inner cylindrical surface;

a first disk member fixed about said first hollow cylinder member in axial alignment with said central rotational axis;

a second floating cylinder member having an outer cylindrical side surface;

a second disk member fixed to a top of said second floating cylinder member;

cooperating thread means on said inner cylindrical surface of said first cylinder member and said outer cylindrical surface of said second floating cylinder member for vertically moving said second floating cylinder member relative to said first cylinder member along said central rotational axis upon rotating said second disk member and said second floating cylinder member relative to said first cylinder member;

a second set of bristles attached to and extending from a bottom end of said second floating cylinder member and outwardly through said bristle support structure along said central rotational axis so that said first set of bristles is positioned in surrounding relation to said second set of bristles;

a first arm member pivotally attached to said first disk member and a second arm member pivotally attached to said second disk member; and

means for moving said first and second arm members to rotate said first and second disk members in an oscillating motion about said central rotational axis such that said first set of bristles and said second set of bristles are moved simultaneously in an oscillating motion through an arc of rotation about said central rotational axis and in opposite rotational directions relative to one another while said cooperating thread means causes said first set of bristles and said second set of bristles to simultaneously move in a linear reciprocating motion, parallel to said rotational axis, with said first set of bristles moving in one linear direction while said second set of bristles move in an opposite linear direction throughout said linear reciprocating motion .

16. The head as recited in Claim 15 further comprising:

a seal about an outer cylindrical surface of said first cylinder member to provide a watertight seal between said first cylinder member and said housing and preventing entry of water and foreign material into said housing.

17. A head for a toothbrush, comprising:

a housing;

a primary drive gear rotatably supported in said housing on a main rotational axis;

means for moving said primary drive gear in an oscillating motion about said main rotational axis;

a plurality of bristle members each movably fitted to said housing about an independent rotational axis, and each of said plurality of bristle members including a first cylindrical member with an outer cylindrical surface disposed in axial alignment with said independent rotational axis, a secondary gear above said cylinder member and in axial alignment with said independent rotational axis, and a first set of bristles extending from a bottom end of said first cylinder member along said independent rotational axis and outwardly from said housing;

a plurality of second hollow cylinder members fixed to said housing, and each of said plurality of second cylinder members being operatively positioned in corresponding alignment with one of said plurality of bristle members and in surrounding relation to said outer cylindrical surface of said first cylinder member;

cooperating thread means on said outer cylindrical surface of said first cylinder member of each of said plurality of bristle members and an inner cylindrical surface of each of said plurality of second cylinder members for moving each of said first cylinder members and said

first set of bristles in a linear direction along said independent rotational axis upon rotation of said first cylinder member of each of said plurality of bristle members;

said secondary gear members of each of said plurality of bristle members positioned and disposed in intermeshing driven engagement with said primary drive gear so that movement of said primary drive gear in said oscillating motion through an arc of rotation about said main rotational axis results in driven oscillating motion of each of said plurality of bristle members through an arc of rotation about said independent rotational axis and rotational movement of said first set of bristles in an oscillating motion about said independent rotational axis of each of said bristle members as said first set of bristles of each of said plurality of bristle members are simultaneously moved in a linear reciprocating motion along said independent rotational axis away from and back towards said housing.

18. The head as recited in Claim 17 wherein said means for moving said primary drive gear in said oscillating motion comprises:

a disk fixed about said main rotational axis and disposed in axial alignment with said main rotational axis;

an arm member pivotally attached to said disk; and

means for moving said arm member in a reciprocating motion to move said disk through an arc of movement about said main rotational axis in an oscillating motion.

19. The head as recited in Claim 17 further comprising:

a first set of said plurality of bristle members and a second set of said plurality of bristle members, said first set of said plurality of bristle members being laterally offset relative to said second set of said plurality of bristle members so that when said first set of bristles on said first set of bristle members move outwardly away from said housing, said first set of bristles on said

second set of bristle members move inwardly towards said housing and, further, when said first set of bristles on said first set of bristle members move inwardly towards said housing, said first set of bristles on said second set of bristle members move outwardly away from said housing throughout said linear reciprocating motion.

20. A head for a toothbrush comprising:

a housing;

a rack gear positioned within said housing;

means for moving said rack gear in a linear reciprocating motion;

a plurality of bristle members each movably fitted to said housing about an independent rotational axis, and each of said plurality of bristle members including a cylinder member with an outer cylindrical surface disposed in axial alignment with said independent rotational axis, a gear formed about said cylinder member and in axial alignment with said independent rotational axis, and a first set of bristles extending from a bottom end of said cylinder member along said independent rotational axis and outwardly from said housing;

cooperating thread means on said outer cylindrical surface of said cylinder member of each of said plurality of bristle members and said housing for moving said cylinder members and said first set of bristles of said plurality of bristle members in a linear direction along said independent rotational axis upon rotation of said cylinder members of said plurality of bristle members; and

said rack gear, including a plurality of rack gear teeth disposed in driven engagement with said gears on said cylinder members of said plurality of bristle members for drivingly rotating said plurality of cylinder members and said first set of bristles of said plurality of

bristle members in an oscillating motion through an arc of rotation about said independent rotational axis.

21. A head for a toothbrush comprising:

a housing;

a plurality of bristle members movably fitted to said housing and each of said plurality of bristle members being supported on an individual rotational axis;

each of said plurality of bristle members including a bristle support structure with a first set of bristles extending outwardly therefrom and arranged in a pattern about said individual rotational axis;

each of said plurality of bristle members further including a hollow cylinder extending upwardly from said bristle support structure and including a first gear member formed thereabout with a plurality of first gear teeth;

a plurality of floating cylinder members, each one of said plurality of floating cylinder members being operatively associated with an individual one of said plurality of bristle members to define a corresponding pair, and each of said floating cylinder members being movably supported on said individual rotational axis of said one of said plurality of bristle members of said corresponding pair;

each of said floating cylinder members including an outer cylindrical surface with a second gear member formed thereabout, including a plurality of second gear teeth, and each of said plurality of floating cylinder members being structured and disposed for receipt within said hollow cylinder of said associated bristle member in said corresponding pair ;

a second set of bristles attached to and extending from each of said plurality of floating cylinder members, and said second set of bristles on each of said plurality of floating cylinder

members extending outwardly through said bristle support structure of said associated bristle member along said individual rotational axis so that said first set of bristles in each corresponding pair is positioned in surrounding relation to said second set of bristles in each corresponding pair;

a rack gear assembly including at least one lower rack gear with a plurality of first rack gear teeth structured and disposed for intermeshing driven engagement with said first gear teeth of said first gear member and at least one upper rack gear laterally offset relative to said at least one lower rack gear, said upper rack gear including a plurality of second rack gear teeth structured and disposed for intermeshing , driven engagement with said second gear teeth of said second gear member of each of said plurality of floating cylinder members in each of said corresponding pairs;

said at least one lower rack gear drivingly engaging said first gear member on each of said plurality of bristle members for rotating said first set of bristles of each of said plurality of bristle members in an oscillating motion about said individual rotational axis in each of said corresponding pairs, and said at least one upper rack gear drivingly engaging said second gear member on each of said plurality of floating cylinder members for simultaneously rotating said second set of bristles of each of said plurality of floating cylinder members in an oscillating motion about said individual rotational axis of each of said corresponding pairs and in an opposite rotational direction relative to said first set of bristles;

cooperating thread means on said hollow cylinder of each of said plurality of bristle members and each of said plurality of floating cylinder members in each of said corresponding pairs for driving said second set of bristles in a linear reciprocating motion outwardly away from said housing and back towards said housing so that said second set of bristles in each of said

corresponding pairs move outwardly and inwardly relative to said first set of bristles in said corresponding pair; and

means for moving said rack gear assembly, including said at least one lower rack gear and at least one upper rack gear, in a linear reciprocating motion for drivingly engaging said first and second gear teeth of said first and second gear members in each of said corresponding pairs.

22. A head for a toothbrush, comprising:

a housing;

a plurality of first sets of bristles, each of said plurality of said first sets of bristles being movably supported on said housing about an individual central rotational axis;

a plurality of second sets of bristles, each of said plurality of said second sets of bristles being operatively positioned with a corresponding one of said plurality of said first sets of bristles and movably supported on said housing about said individual central rotational axis of said corresponding one of said plurality of said first sets of bristles, and each of said correspondingly positioned first and second sets of bristles defining one of a plurality of bristle hairs; and

a motion directing assembly structured and disposed for rotating each of said plurality of said bristle pairs in an oscillating motion about said individual central rotational axis corresponding to each of said plurality of said bristle pairs, and said motion directing assembly being further structured and disposed for simultaneously moving each of said plurality of said bristle pairs in a linear reciprocating motion and parallel to said central rotational axis corresponding to each of said plurality of said bristle pairs so that said first set of bristles in each bristle pair is moving in a linear direction while said second set of bristles in each of said bristle pairs is moving in an opposite linear direction throughout said linear reciprocating motion.

23. The head as recited in Claim 22 wherein said motion directing assembly is structured for moving said first set of bristles in each of said bristle pairs in said oscillating motion in one rotational direction about said arc of rotation while simultaneously moving said second set of bristles in each of said bristle pairs in said oscillating motion in an opposite rotational direction about said arc of rotation so that each of said first set of bristles counter-rotate relative to said corresponding second set of bristles in each of said bristle pairs.

24. The head as recited in Claim 22 wherein each of said second sets of bristles is arranged in a tuft along said individual central rotational axis of said bristle pair.

25. The head as recited in Claim 23 wherein said plurality of said first sets of bristles and said motion directing assembly are structured and disposed for moving a first portion of said first sets of bristles in said linear reciprocating motion in one linear direction while simultaneously moving a second portion of said first sets of bristles in said linear reciprocating motion and in an opposite linear direction relative to said first portion of said first sets of bristles.

26. The head as recited in Claim 23 wherein said plurality of said second sets of bristles and said motion directing assembly are structured and disposed for moving a first portion of said plurality of said second sets of bristles in said linear reciprocating motion in one linear direction while simultaneously moving a second portion of said plurality of said second sets of bristles in said linear reciprocating motion and in an opposite linear direction relative to said first portion of said plurality of said second sets of bristles.